

## **SECTION 709 METAL PIPE**

### **709.01 DUCTILE IRON AND STEEL WATER PIPE.**

**709.01.1 Ductile Iron Water Pipe.** Furnish ductile iron pipe meeting AWWA C 151 requirements for the pipe class specified in the Contract.

Use mechanical or slip-on joints meeting AWWA C 111 (ANSI A 21.11) requirements. Construct the joints to provide electrical conductivity using bronze shims, or gaskets with metallic shims molded into the gasket.

**709.01.2 Steel Water Pipe.** Furnish steel pipe meeting AWWA C 200 Standard for Water Pipe, 6-inches (155 mm) and Larger.

Field weld joints and bends meeting AWWA C 206 requirements. Meet AWWA C 203 requirements for shop and field coatings.

**709.02 CORRUGATED STEEL PIPE AND PIPE ARCHES.** Furnish corrugated steel pipe that is lock seam helically corrugated pipe or continuously welded seam corrugated pipe.

Furnish corrugated steel pipe and pipe arches and coupling bands meeting AASHTO M 36 requirements (excluding projection bands under 9.1.3) and the following:

- A. When pipe is cut and to be rejoined, matchmark cut pipe ends and rejoin the matching ends during installation.
- B. When using corrugated locking bands, re-roll the pipe ends forming at least two annular corrugations. Unraveling of lock seams due to re-rolling pipe ends is a defect and the pipe will be rejected.

Repair zinc or aluminized pipe coating damaged by re-rolling using a zinc rich paint. Apply the paint to provide a minimum 0.005 inch (0.13 mm) thickness.

If flanges are provided on the pipe ends, the coupling may be made by interlocking the flanges with a preformed channel band or other band incorporating a locking channel that meets AASHTO M 36 requirements. These bands may be used only on pipes with diameters up to and including 36-inches (915 mm).

The coupling bands or devices other than those specified in AASHTO M 36 require the Project Manager's approval before use.

Meet the following additional requirements for syphon and irrigation pipe installations.

- 1. Use lock seam helically corrugated pipe, or welded seam helically corrugated pipe;
- 2. Continuously weld lock seams from end to end of each lock seam helically corrugated pipe section for syphon installations. Perform the welding after re-rolling the ends;
- 3. For irrigation installations using lock seam helically corrugated pipe, weld the lock seams as specified above or fabricate by inserting a 3/16-inch (5 mm) diameter continuous rubber chord meeting pipe industry standards into the lock seam during fabrication, all meeting AASHTO M 36.

Construct watertight field joints. Make the connection using a 10½-inch (267 mm) wide "hugger" type band. Hugger bands must have O-ring

gaskets. Lubricate and install gaskets and coupling bands following the manufacturer's recommendations.

The Project Manager may direct the fabricator to conduct a watertightness test, witnessed by an inspector, on the type or types of pipe and coupling devices to be furnished. Submit the test method to the Project Manager for approval before testing. Alternate test methods may be required.

**709.03 STEEL STRUCTURAL PLATE PIPE AND PIPE ARCHES.** Use galvanized corrugated steel structural plates and fasteners for constructing pipe meeting AASHTO M 167 requirements.

Bevel the end plates of structural steel pipe plate arches as specified.

Meet AASHTO M 245 requirements for allowable tolerance in span and rise for pipe arches.

Provide the Project Manager a supplier's itemized statement of the plate sizes for each shipment for field inspection of the plates. Department inspection will include examining pipe for deficiencies in the lengths of sheets used and evidence of poor workmanship. Samples may be taken for chemical analysis and weight of spelter coating.

**709.04 BITUMINOUS COATED CORRUGATED STEEL PIPE, PIPE ARCHES, STEEL STRUCTURAL PLATE PIPE AND PIPE ARCHES.** Meet AASHTO M 243 pipe coating requirements except as modified below:

Clean and dry the surface to be coated before applying the bituminous coating. Apply coating with the ambient air temperature at least 50 °F (10 °C) and rising. Coat the full circumference of the pipes outside and the bottom up to one third of the vertical height of the pipes inside circumference. Provide a coat thickness of at least 0.05-inch (1.3 mm).

**709.05 PRE-COATED, GALVANIZED STEEL CULVERTS AND UNDERDRAINS.** Meet AASHTO M 245 and 246 requirements and the requirements of Subsection 709.02 for irrigation and syphon pipe installations.

Provide a minimum 0.010 in (0.25 mm) coating for both inside and outside surfaces meeting AASHTO M 246, Section 7 requirements.

**709.06 CORRUGATED STEEL PIPE FOR UNDERDRAINS.** Furnish pipe and coupling bands meeting AASHTO M 36 requirements. The class of underdrain in AASHTO M 36 is the Contractor's option.

Furnish semi-circular underdrain and coupling bands meeting AASHTO M 36 requirements and the Detailed Drawings. Furnish nuts, caps, screws and other parts galvanized meeting ASTM A 153 or B 695 (Class 50). Furnish screens and caps for semicircular underdrains meeting the Detailed Drawings.

Furnish bituminous coated underdrains meeting AASHTO M 190 requirements. Nuts, bolts and screens must not be coated.

**709.07 CORRUGATED ALUMINUM PIPE AND PIPE ARCH CULVERTS.** Furnish corrugated aluminum pipe and pipe arch culverts meeting AASHTO M 196 requirements, and the modifications to AASHTO M 36 specified in Subsection 709.02.

**709.08 CORRUGATED ALUMINUM PIPE FOR UNDERDRAINS.** Furnish corrugated aluminum pipe for underdrains meeting AASHTO M 196 requirements.

**709.09 SEAMLESS STEEL PIPE.** Furnish seamless steel pipe meeting ASTM A 53 requirements.

**709.10 COPPER PIPE.** Furnish copper pipe and tube meeting ASTM B 88, Type K, requirements.

**709.11 SLOTTED CORRUGATED STEEL PIPE.** Furnish slotted corrugated steel pipe that is commercially fabricated with the grate and steel pipe an integral unit. Pressure or fusion weld the grate spacer bars to the bearing bar. Meet ASTM A 36 requirements for grating materials galvanized after fabrication.